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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,661	03/10/2004	Kei Hiruma	9319G-000730	3945
27572 7590 07/13/2007 HARNESSE, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			EXAMINER SCHECHTER, ANDREW M	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/797,661

Applicant(s)

HIRUMA, KEI

Examiner

Andrew Schechter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2007.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16,17,20,22,27 and 28 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 16,17,20,22,27 and 28 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 10 April 2007 have been fully considered but they are not persuasive. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues [p. 7] that *Hsieh* does not disclose that the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the pixel regions. This is not persuasive, as it appears to the examiner that this is the case, within the examiner's interpretation of "roughly equal". The applicant argues [pp. 7-8] that *Hsieh*'s droplets are restricted by the size of the recessed portions, which is true, and does not disclose controlling the diameter after impact, which is not persuasive to the examiner, since the diameter is controlled (albeit primarily by the recessed portions).

However, claim 16 has been amended to recite "discharging the liquid droplets from the nozzles such that each of the liquid droplets has said weight and thereby the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch" (emphasis added). In the examiner's interpretation, the addition of "thereby" requires the diameter to be determined by the act of discharging the droplets such that they have the said weight, rather than being due to other features such as the recessed portions in *Hsieh*. Therefore, this amendment distinguishes the method from that of *Hsieh*.

On the other hand, the amended claim 20 recites not a method, but a liquid crystal discharging device. For the claimed device, the clause containing "thereby"

does not distinguish the device from the prior art as it does in the case of the method claim, since the claimed device must be structurally distinguishable from the prior art [see MPEP 2114].

Claim Objections

2. Claim 16 is objected to because of the following informalities: arrangement in line 5 should be "discharging". Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 16, 17, 20, 22, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Masazumi et al.*, U.S. Patent No. 6,331,884 in view of *Hashizume et al.*, US 2002/0062787 and further in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410.

Masazumi discloses [see Fig. 5; for instance] a liquid crystal discharging method for discharging liquid crystal from a discharge unit to arrange the liquid crystal on a substrate on which a plurality of pixel regions composed of a plurality of pixels are formed, the discharge unit including a plurality of nozzles [N2, N3, N4] for discharging the liquid crystal [9a, 9a', 9a''] in a form of liquid droplets, the liquid crystal arrangement

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method comprising discharging the liquid droplets from the nozzles such that each of the liquid droplets has a certain amount and thereby the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions [see Fig. 1B; note that since the resin 9b constitutes a non-display area, it will have a small size relative to the pixel display area, so the diameter will be "roughly equal" to arrangement pitch, within the scope of how the examiner understands that relative term; also note that the resin does not act to define the placement of the liquid crystal as the recessed portions in *Hsieh* do], and each of the plurality of pixel regions is coated with the liquid droplets.

Masazumi does not disclose measuring a weight of a single liquid droplet for obtaining a diameter and determining an arrangement pitch of the liquid droplets to be arranged in line on the substrate based on the diameter of the liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance.

Masazumi appears to be silent on how the amount of the liquid crystal dropped is determined.

Hashizumi discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the

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drop sizes to be constant, despite environmental (or other) changes during the processing.

Yamamoto teaches [see Fig. 7] that when using an ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an arrangement pitch of the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

Claim 16 is therefore unpatentable.

The arrangement pitch of the liquid droplets is roughly equal to the diameter of the liquid droplets after impact [again, within the examiner's understanding of the relative term "roughly equal"], so claim 17 is also unpatentable.

Masazumi does not disclose that the arrangement pitch is obtained by selecting a subset of the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. The examiner takes official notice that ink-jet heads having a plurality of nozzles, with only a subset of nozzles being activated at a given instant, are well-known in the art. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by the desire to have the flexibility to use an available nozzle head and selecting a subset of its nozzles having the desired arrangement pitch, rather than having to obtain a specially designed nozzle head having

its nozzle arrangement matching the pixel arrangement (which can vary for different devices which would beneficially be manufactured using the same equipment). Claim 27 is therefore unpatentable.

Considering the additional limitations of claims 20, 22, and 28, the above-discussed method in the prior art implies a liquid crystal discharging device including a controller as recited and a drive system as recited, so claims 20, 22, and 28 are also unpatentable.

5. Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Hashizume et al.*, US 2002/0062787 and further in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410.

Considering claim 20, *Hsieh* discloses [see Fig. 3E, for instance] a liquid crystal discharging device comprising a discharge unit for discharging liquid crystal [170] to arrange the liquid crystal on a substrate [100] on which a plurality of pixel regions composed of a plurality of pixels are formed, the discharge unit comprising a plurality of nozzles which discharge liquid crystal in a form of liquid droplets, with each of the plurality of pixel regions being coated with the liquid droplets.

Hsieh does not disclose a weight measurement device which measures a weight of the single liquid droplet, and the discharge unit discharging the liquid droplets from the nozzles such that each of the liquid droplets has said weight and thereby the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of

the plurality of pixel regions, and each of the plurality of pixel regions is coated with the liquid droplets.

Hashizumi discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the drop sizes to be constant, despite environmental (or other) changes during the processing. As discussed above [see the Response to Arguments section], the limitation “thereby the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions, and each of the plurality of pixel regions is coated with the liquid droplets” does not distinguish the claimed device structurally as it does for the method claim 16.

Hsieh also does not disclose that there is a controller that controls an interval between the liquid crystal discharged from the nozzles based on a diameter of the liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance. This has two parts: the controller, and what is considered when determining the arrangement pitch of the liquid droplets.

Yamamoto discloses [see Fig. 7] having the nozzles move along the substrate at a certain rate; this inherently requires a controller which controls the rate and thus the interval between the droplets. *Yamamoto* also teaches [see Fig. 7] that when using an

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ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an interval between the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

Claim 20 is therefore unpatentable.

Considering claim 22, *Hsieh* appears to disclose aligning each impact location of the liquid droplets with each location of the pixel regions (if not, this would have been an obvious matter of optimization). However, *Hsieh* does not disclose a drive system for moving the nozzle and the substrate relative to each other (*Hsieh* shows only a cross-sectional slice of its device, and is silent on how the entire substrate is covered).

Yamamoto discloses [see Figs. 6 and 7, for instance] an inkjet device with a plurality of nozzles [Fig. 6] as shown in *Hsieh*, which covers the entire substrate by being moved by a drive system [inherent in Fig. 7]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use such a drive system in the device of *Hsieh*, motivated by the desire to use a single small set of nozzles to efficiently and flexibly cover substrates of varying sizes. Claim 22 is therefore unpatentable.

6. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Hashizume et al.*, US 2002/0062787 and

Yamamoto et al., Japanese Patent Document No. 09-138410 as applied above, and further in view of *Yamamoto et al.*, US 2004/0201818.

Yamamoto '818 discloses [see Fig. 5] a ink-jet nozzle system in which the nozzles are controllable (by a controller). It would have been obvious to one of ordinary skill in the art at the time of the invention to use such an ink-jet system, motivated by the desirability of being able to control the nozzles to turn on and off.

In the device and method discussed above, liquid is dropped from all the nozzles shown in *Hsieh* and *Yamamoto*; alternatively stated, the arrangement pitch is obtained by selecting all the nozzles, and the nozzles have a pitch equal to the arrangement pitch, among the plural nozzles. Similarly, the controller controls the interval in part by selecting all the nozzles, as well as in part by selecting the drive speed. [The examiner notes that the claim does not explicitly require the selection of a subset of the plurality of nozzles. The examiner further notes that an amendment to require "a subset of the nozzles" as in claim 27 would not make the claim allowable, as this would have been obvious to one of ordinary skill in the art at the time of the invention motivated by the desire to have the flexibility to use an available nozzle head regardless of the desired pixel pitch by such an adjustment, rather than needing a specially designed nozzle head whose nozzle pitch matched the desired pixel pitch, as discussed with respect to claim 27.] Claim 28 is therefore unpatentable.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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6 July 2007